A.D. 1865, 16*th* FEBRUARY. N° 451.

SPECIFICATION

OF

RICHARD SMITH.

TREATING SEWAGE AND VENTILATING SEWERS.

LONDON:
PRINTED BY GEORGE E. EYRE AND WILLIAM SPOTTISWOODE,
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1865.

A.D. 1865, 16th *February*. N° 451.

Treating Sewage and Ventilating Sewers.

LETTERS PATENT to Richard Smith, of Cumming Street North, Pentonville, in the County of Middlesex, for the Invention of "**Improvements in Treating Sewage, and in Arranging Apparatus in Sewers and Culverts to Facilitate the Ventilation of such Structures.**"

Sealed the 8th August 1865, and dated the 16th February 1865.

PROVISIONAL SPECIFICATION left by the said Richard Smith at the Office of the Commissioners of Patents, with his Petition, on the 16th February 1865.

I, Richard Smith, of Cumming Street North, Pentonville, in the County of Middlesex, do hereby declare the nature of the said Invention for "**Improvements in Treating Sewage, and in Arranging Apparatus in Sewers and Culverts to Facilitate the Ventilation of such Structures,**" to be as follows :—

This Invention has for its object improvements in treating sewage, and in arranging apparatus in sewers and culverts to facilitate the ventilation of such structures. For these purposes sewers have, according to this Invention, at suitable intervals apart, applied to them transverse floating valves which rise and fall with the sewage which for the time is running through a sewer, so that the spaces between the several valves are separated one from the other, and thus is the travelling of the gases and vapours along a sewer prevented and the ventilating of the sewers in sections facilitated either by chimney shafts or otherwise. In order to disinfect sewage either in the sewers, or in

sumps, or chambers, or reservoirs into which sewage waters are received, peat, sawdust, or other ligneous fibrous matters are employed saturated or impregnated with sulphurous acid or superphosphate of lime. The peat or sawdust or other ligneous fibrous matters are first dried as perfectly as possible to drive off all moisture, and then the sulphurous acid or superphosphate of lime is combined therewith, and the product is mixed with the sewage waters. I also in some cases saturate such dried materials with diluted sulphuric acid, but not of such strength as to char the fibrous matters. I also apply rock salt or manufactured salt in a pulverized or granular state, and soot, and mix the same with sewage waters for the same purpose.

In ventilating sewers and culverts whether by chimney shafts, or by fans, or by other mechanical means, the exhaustion thereby obtained in the sewers or culverts is taken advantage of, and the sewers or culverts are arranged to receive the smoke from chimneys of contiguous houses, the chimneys and flues being arranged to act by a downward draft so that the smoke may pass into the culverts or sewers, which it will readily do by reason of the exhaustion therein, but I would state that such mode of connecting flues of houses with culverts or sewers is not new, but in addition to such arrangements I further cause steam to flow into and pervade the sewers or culverts, so that by the joint action of the steam and the smoke the sewage waters in the culverts or sewers are disinfected.

SPECIFICATION in pursuance of the conditions of the Letters Patent, filed by the said Richard Smith in the Great Seal Patent Office on the 16th August 1865.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, RICHARD SMITH, of Cumming Street North, Pentonville, in the County of Middlesex, send greeting.

WHEREAS Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the Sixteenth day of February, in the year of our Lord One thousand eight hundred and sixty-five, in the twenty-eighth year of Her reign, did, for Herself, Her heirs and successors, give and grant unto me, the said Richard Smith, Her special licence that I, the said Richard Smith, my executors, administrators, and assigns, or such others as I, the said Richard Smith, my executors, administrators, and assigns, should at any time agree with, and no others, from time to time and at all times thereafter during the term therein expressed, should and lawfully might make, use,

exercise, and vend, within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man, an Invention for "IMPROVEMENTS IN TREATING SEWAGE, AND IN ARRANGING APPARATUS IN SEWERS AND CULVERTS TO FACILITATE THE VENTILATION OF SUCH STRUCTURES," upon the condition (amongst others) that I, the said Richard Smith, my executors or administrators, by an instrument in writing under my, or their, or one or their hands and seals, should particularly describe and ascertain the nature of the said Invention, and in what manner the same was to be performed, and cause the same to be filed in the Great Seal Patent Office within six calendar months next and immediately after the date of the said Letters Patent.

NOW KNOW YE, that I, the said Richard Smith, do hereby declare the nature of the said Invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement thereof, that is to say :—

This Invention has for its object improvements in treating sewage, and in arranging apparatus in sewers and culverts to facilitate the ventilation of such structures. For these purposes sewers have, according to this Invention, at suitable intervals apart, applied to them transverse floating valves which rise and fall with the sewage which for the time is running through a sewer, so that the spaces between the several valves are separated one from the other, and thus is the travelling of the gases and vapours along a sewer prevented and the ventilating of the sewers in sections facilitated either by chimney shafts or otherwise. In order to disinfect sewage either in the sewers, or in sumps, or chambers, or reservoirs into which sewage waters are received, peat, sawdust, or other ligneous fibrous matters are employed saturated or impregnated with sulphurous acid or superphosphate of lime. The peat or sawdust or other ligneous fibrous matters are first dried as perfectly as possible to drive off all moisture, and then the sulphurous acid or superphosphate of lime is combined therewith, and the product is mixed with the sewage waters. I also in some cases saturate such dried materials with diluted sulphuric acid, but not of such strength as to char the fibrous matters. I also apply soot, and mix the same with sewage waters for the same purpose.

In ventilating sewers and culverts whether by chimney shafts, or by fans or by other mechanical means, the exhaustion thereby obtained in the sewers or culverts is taken advantage of, and the sewers or culverts are arranged to receive the smoke from chimneys of contiguous houses, the chimneys and flues being arranged to act by a downward draft so that the smoke may pass into the culverts or sewers, which it will readily do by reason of the exhaustion therein, but I would state that such mode of connecting flues of houses with culverts or

sewers is not new, but in addition to such arrangements I further cause steam to flow into and pervade the sewers or culverts, so that by the joint action of the steam and the smoke the sewage waters in the culverts or sewers are disinfected.

Having thus stated the nature of my Invention I will proceed more fully to describe the manner of performing the same.

Description of the Drawings.

Figure 1 shows a transverse section of a sewer and of a rotatory fan connected therewith by two pipes; Figure 2 shows a longitudinal section of a sewer and rotating fan together with a section of a chimney or shaft; and Figure 3 shows a plan in section of the sewer and fan. *a*, *a*, is the sewer, which at *b*, *b*, has a transverse valve with a float, by which the valve is caused to rise and fall according as the sewage rises and falls within the sewer; *c*, *c*, is a rotatory fan in a suitable case. The gases and vapours in one section of a sewer cannot pass the valve so as to get into the next section of the sewer, and by using valves at intervals along a line of sewer such sewer will be divided into sections, and the gases and vapours in each section may be kept separate and be subjected to the action of fire in the following manner:—The gases and vapours in one section of a sewer may be removed from that section of the sewer and forced into the next section of the sewer by a rotating fan or other mechanism, and by having a furnace and shaft or chimney connected with such section of the sewer, either near to or at a distance from the valve, the gas and vapour products may be caused to pass out of the sewer into a closed ash-pit of the fire. Or in place of employing pumping apparatus, each section of a sewer may be provided with a shaft or chimney and furnace. By thus using exhausting apparatus, and by dividing sewers with floating valves, and by admitting steam from steam boilers, and connecting the flues of contiguous buildings with the sewers, smoke and soot will be conveniently introduced into sewers, which mixing with the steam, the same will be more or less condensed and will be mixed with the sewage therein, and such soot and smoke will in combining with the sewage not only tend to deodorize the sewage but render the same more advantageous for agricultural purposes. I would remark that I am aware that it has before been proposed to connect flues of contiguous buildings with sewers, I do not therefore claim the same excepting only when used in combination with my other improvements whereby sewers are divided by floating valves into sections, and such sections are partially exhausted by fans or pumping apparatus, or by chimneys or shafts, as above explained.

Smith's Improvements in Treating Sewage and Ventilating Sewers.

The second part of my Invention consists in applying certain matters herein described to sewage in order to deodorize and to improve the character of sewage for the purposes of agriculture. For these purposes I employ sawdust or other vegetable ligneous matters impregnated with diluted sulphurous or with diluted sulphuric acid, or with superphosphate of lime. For these purposes the sawdust, peat, or ligneous substance is to be in as dry a state as may be, and it is then to be combined with the diluted acid or with superphosphate of lime. The proportions of these matters applied to the sewage waters may be greatly varied. I prefer to employ sulphuric acid of commerce diluted with about two and a half measures of water to one measure of acid; the object is not to burn or char the wood or ligneous matters by the acid. Or sulphurous acid may be used diluted with water to any desired extent to impregnate the sawdust, peat, or other dry ligneous matters. These matters are to be stirred into and mixed with sewage matters in the sewers, or in tanks or other vessels or receivers. By thus combining sewage with sawdust, peat, or other dry ligneous matters with sulphurous or sulphuric acid, or with superphosphate of lime, the sewage will not only be deodorized to the desired extent, but the sewage will be rendered more valuable as a manure.

In witness whereof, I, the said Richard Smith, have hereunto set my hand and seal, this Fifteenth day of August, in the year of our Lord One thousand eight hundred and sixty-five.

R. SMITH. (L.S.)

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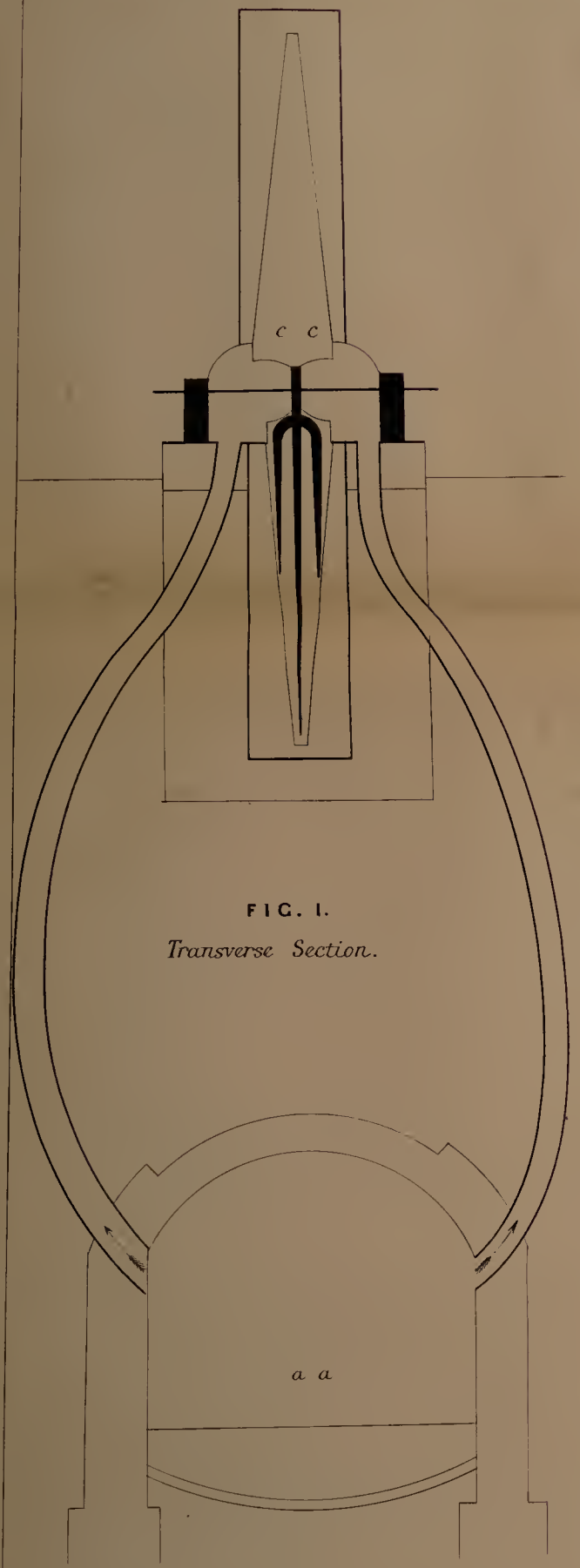
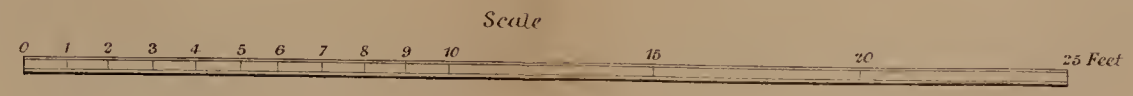


FIG. 1.
Transverse Section.



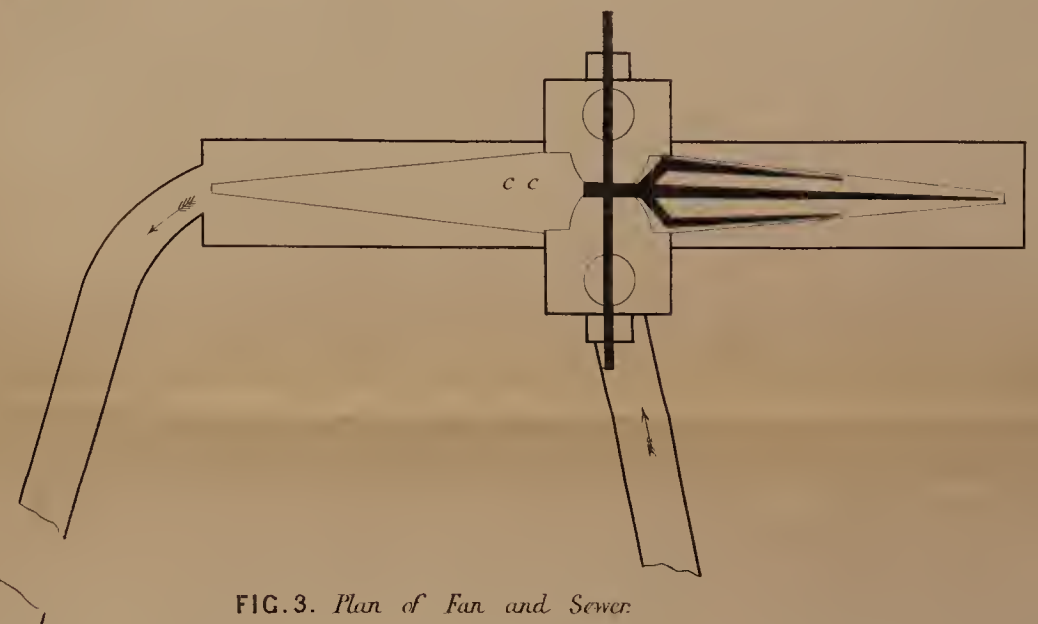
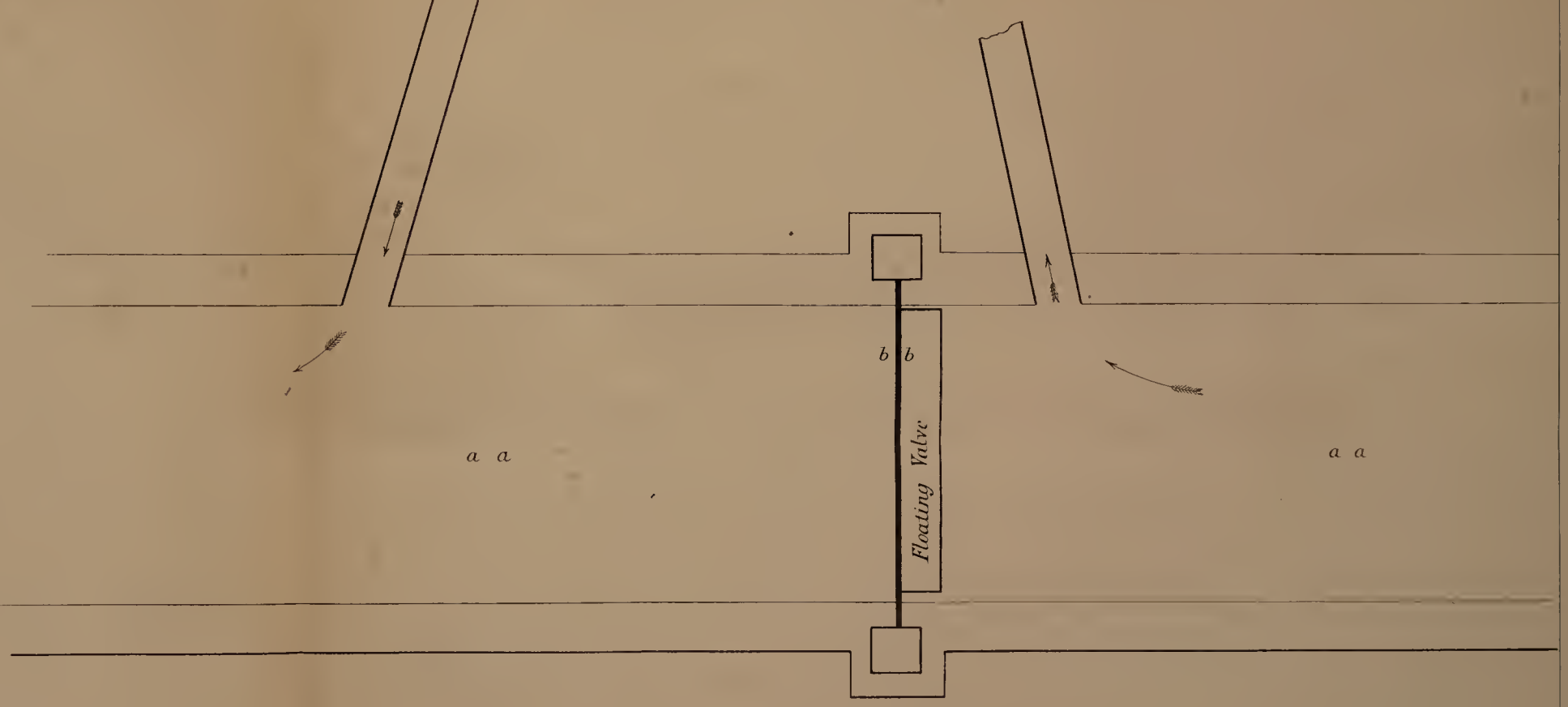


FIG. 3. *Plan of Fan and Sewer*



The filed drawing is colored

Drawn on Stone by Maltby & Sons

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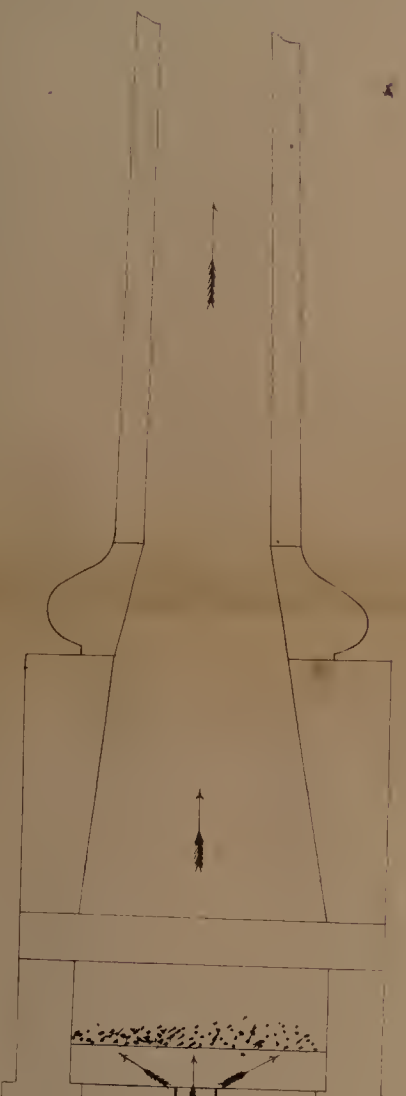
Section of Furnace and Shaft



Scale

0 1 2 3 4 5 6 7 8 9 10 15 20 25 *Feet*

FIG. 2.

Longitudinal Section of Fan and Sewer

The filed drawing is partly colored.

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